
**वस्त्रादि — कांच और कांच-पॉलीएस्टर के
रेशों से बुने हुए फीते**
भाग 1 विशिष्टि
(चौथा पुनरीक्षण)

**Textiles — Glass and Glass-
Polyester Fibre Woven Tapes**
Part 1 Specification
(Fourth Revision)

ICS 59.060.20, 59.080.50

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FOREWORD

This Indian Standard (Part 1) (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Clothtech Applications including Narrow Fabrics and Braids Sectional Committee had been approved by the Textile Division Council.

Glass fibre woven tapes possess properties like excellent di-electric properties, good chemical resistance, good reinforcement to insulating varnishes, armoring against mechanical damage due to which they are intended for use in transformers, industrial machines, turbo-generators and water-wheel alternators.

This standard, first published in 1969, was subsequently revised in 1974, 1988 and 1999. This standard has been revised again and divided into two parts. Part 2 of this standard gives methods of test for various requirements. This standard has been revised again to incorporate the following major changes:

- a) BIS certification marking clause has been modified;
- b) References to Indian Standard given in Annex A has been included; and
- c) Sampling and criteria for conformity have been modified.

In the preparation of this standard, substantial assistance has been derived from IEC 1067-1 : 1992 'Specification for glass and glass polyester fibre woven tapes — Part 1: Definitions, classifications and general requirements' and IEC 1067-3 : 1992 'Glass and glass polyester fibre woven tapes — Part 3 : Specifications for individual materials — Sheet 1: Types 1, 2 and 3 tapes'.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*TEXTILES — GLASS AND GLASS-POLYESTER FIBRE
WOVEN TAPES

PART 1 SPECIFICATION

*(Fourth Revision)***1 SCOPE**

1.1 This standard-prescribes constructional particulars and other requirements for loom-state, continuous filament tapes woven on conventional or shuttleless looms either from glass fibres or a combination of glass and polyester fibres.

1.2 This standard cover tapes of nominal width of 10 mm to 50 mm with nominal thickness of 0.05 mm to 0.40 mm.

2 REFERENCES

The standard listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standard.

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Filament — A single glass fibre as drawn.

3.2 Strand — A plurality of filament bonded with size.

3.3 Yarn — A number of strands put together with twist.

3.4 Linear Density — The mass in grams per kilometre of strand (Tex).

3.5 End — Individual warp thread.

3.6 Pick — Weft thread or group of threads inserted in a fabric by one traverse of the picking mechanism between two consecutive beat-ups.

3.7 Size — A mixture of organic materials applied to the strand during manufacture to facilitate yarn processing and weaving.

3.8 Locking Thread — Independent thread used to lock the weft threads.

3.9 Shuttleless Loom — Loom in which the weft is inserted by means other than shuttle and is drawn from stationary supply.

3.10 Heat Set Yarn — Yarn which has been heat treated so that subsequent shrinkage is reduced.

4 CLASSIFICATION

The tapes are classified into three types namely:

- a) *Type 1* — Tapes woven on shuttle looms with glass yarn in both warp and weft direction;
- b) *Type 2* — Tapes woven on shuttleless looms with glass yarn in both warp and weft direction; and
- c) *Type 3* — Tapes woven on shuttleless looms with glass fibres in warp direction and polyester filament in the weft direction.

5 MANUFACTURE**5.1 Yarn**

The glass yarn used shall be continuous filament glass fibres (usually known-as 'E' glass) containing not more than 1 percent of alkali calculated as sodium oxide. The polyester yarn shall be continuous filament polyethylene terephthalate (PET) and shall be heat set.

5.2 Weave

The tape shall be woven in plain weave with selvages. The selvages shall be uniform. The tape shall be in the loom-state condition and shall not be calendered.

5.3 Locking Thread

For Type 2 and Type 3 tapes, the picks shall be interlocked at or near the selvedge opposite the one from which weft is inserted, thus preventing unravelling of the selvages during use. If a locking thread, which may be of organic material, is used, the method of interlocking shall be such that the thread cannot be pulled out of the body.

5.4 Centre Marking

Centre line/markings of any colour may be provided if specified by the buyer.

5.5 Identification of Types of Tapes

Tapes shall be identified according to type as follows:

- a) *Type 1* — A single coloured warp thread positioned so as to indicate the centre line of the tape.
- b) *Type 2* — Two coloured warp threads close together and positioned so as to indicate the centre line of the tape.
- c) *Type 3* — Three coloured warp threads close together and positioned so as to indicate the centre line of the tape.

6 REQUIREMENT

6.1 Thickness

The nominal thickness measured between the selvages of the tape shall comply with the values given in Table 1. Thickness, when measured at the selvages, shall not exceed the thickness between the selvages by more than 0.02 mm for Type 1 or 0.03 mm for Type 2 and Type 3. The thickness of tapes shall be determined by the method prescribed in Part 2 of this standard.

6.2 Width

The nominal widths of tape are 10 mm, 13 mm, 15 mm, 20 mm, 25 mm, 30 mm, 40 mm and 50 mm. The width of the tape as determined, in accordance

with the method given in Part 2 of this standard, shall not differ from that specified by more than:

- a) ± 1.0 mm for nominal widths up to and including 25 mm; and
- b) ± 1.5 mm for nominal widths over 25 mm.

6.3 Length

Unless otherwise specified, the tape shall be supplied on rolls in 50 m length. The number of joints per roll shall not exceed two, and none of the tape pieces in a roll shall be shorter than 10 m. The length of the tape in each roll shall be determined by the method prescribed in IS 1954.

6.3.1 In case of roll with joints, the tape pieces shall be butted and joined up by a strip of coloured gummed tape which shall show on the edge of roll to indicate the presence of joint. Pins or other metal fasteners shall not be used for securing, the ends of rolls or for joining the tape.

6.3.2 The number of rolls having joints shall not exceed the following:

- Type 1 — 30 percent
- Type 2 — 30 percent
- Type 3 — 20 percent

6.4 Tensile Strength

The tape shall comply with the requirement of tensile strength as given in Table 2 when tested by the method prescribed in Part 2 of this standard.

Table 1 Thickness and Tolerance

(Clause 6.1)

Sl No.	Nominal Thickness	Minimum Thickness	Maximum Thickness
	mm	mm	mm
(1)	(2)	(3)	(4)
i)	0.09	0.08	0.11
ii)	0.13	0.12	0.17
iii)	0.18	0.16	0.21
iv)	0.23	0.21	0.26
v)	0.28	0.26	0.31
vi)	0.40 (<i>see note</i>)	0.37	0.43

NOTE — Normally available in Type 2 and Type 3.

Table 2 Tensile Strength in Warp Direction

(Clause 6.4)

Sl No.	Nominal Thickness mm	Tensile Strength in Warp Direction, <i>Min</i> (N/mm)	
		Type 1 and Type 2	Type 3
(1)	(2)	(3)	(4)
i)	0.09	25	30
ii)	0.13	30	35
iii)	0.18	40	45
iv)	0.23	45	65
v)	0.40	70	75

6.5 Other Requirements

The tapes shall conform to the requirements given in Table 3 when tested by the respective methods of test given in Part 2 of this standard.

7 PACKING**7.1 Winding**

The tape shall be wound on a hard tubular core with sufficient tension to form a compact roll but without

deforming the construction of the tape. The internal diameter of core shall be not less than 10 mm and not more than 13 mm and its width shall be approximately the same as the width of the tape but shall not exceed it. The roll shall not get loosened when dropped on floor from a height of one metre. Alternatively individual core having a diameter of 55 mm is also permitted.

The tapes shall be wound in an anti-clockwise spiral when the roll is viewed from the locking thread, as shown in Fig. 1.

Table 3 Requirements of Glass and Glass Polyester Woven Tapes

(Clause 6.5)

Sl No.	Characteristic	Requirement
(1)	(2)	(3)
i)	Warp ends:	
	a) Nominal thickness ≤ 0.13 mm	≥ 25 per cm of nominal width
	b) Nominal thickness ≥ 0.13 mm	≥ 20 per cm of nominal width
ii)	Picks:	
	a) Nominal thickness ≤ 0.13 mm	≥ 14 per cm
	b) Nominal thickness > 0.13 mm	≥ 10 per cm
iii)	Effect of heating in air:	
	a) Types 1 and 2	Tensile strength retention > 50 percent; No change in width; Loss in width < 5 percent
	b) Type 3	
iv)	Residue on ignition (Glass content):	
	a) Types 1 and 2	> 97.5 percent
	b) Types 3	not applicable
v)	Electrical conductivity of aqueous extract	< 15 mS/m

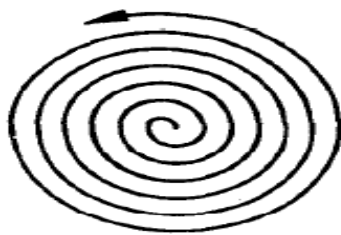


FIG. 1 VIEW OF ROLL FROM LOCKING THREAD SIDE

8 MARKING

8.1 Outer end of tape of each roll shall be legibly marked with the following information:

- a) Type of tape;
- b) Length of roll in meters;
- c) Thickness and width of tapes in millimetre;
- d) Manufacturer's name, initials or trade-mark, if any;
- e) Year of manufacture; and
- f) Any other information/instruction provided by the manufacturer/required under law.

8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

8.3 Package containing numbers of rolls as agreed to between the buyer and the seller shall be marked with the followings:

- a) Number of rolls in the package;
- b) Type of tape;
- c) Length of roll in metres;
- d) Thickness and width of tapes in millimetres;
- e) Manufacturer's name, initials or trade-mark, if any;
- f) Year of manufacture; and
- g) Any other information/instruction provided by the manufacturer/required under law.

9 SAMPLING

9.1 Lot

The quantity of tape of one definite variety delivered to one buyer against one dispatch not shall constitute a lot.

9.2 The conformity of a lot to the requirements of this standard shall be determined on the basis of tests carried out on rolls of tape selected from the lot.

9.3 Unless otherwise specified, the number of rolls of tape to be selected at random from a lot shall be as given Table 4.

9.4 For evaluating width, length, ends per centimetre, picks per centimetre and thickness, the number of rolls selected in col (3) Table 4 shall constitute the test sample.

9.5 For evaluating tensile strength, electrical conductivity of aqueous extract, effect of heating in air and glass content, the number of rolls selected in col (5) of Table 4 shall constitute the test sample. The rolls shall be selected at random from those drawn for purpose of **9.4**. The required test specimens shall be drawn from each of the rolls and subjected to corresponding tests.

9.6 Criteria for Conformity

The lot shall be considered as conforming to the requirements of the standard if the following conditions are satisfied:

- a) The number of rolls found defective for any one or more of the characteristics mentioned in **9.4** does not exceed the corresponding number given in col (4) of Table 4; and
- b) None of the test samples fails to meet the specified requirement in respect of the characteristics mentioned in **9.5**.

Table 4 Sample Size and Criteria for Conformity*(Clauses 9.3, 9.4, 9.5 and 9.6)*

Sl No.	Lot Size (Number of Rolls)	Sample Size	Permissible Number of Defective Rolls	Sub-sample Size
(1)	(2)	(3)	(4)	(5)
i)	Up to 50	3	0	3
ii)	51 to 150	5	0	3
iii)	151 to 300	8	1	4
iv)	301 to 500	13	1	5
v)	501 and Above	20	2	7

ANNEX A*(Clause 2)***LIST OF REFERRED INDIAN STANDARD**

<i>IS No.</i>	<i>Title</i>
IS 1954 : 1990	Determination of length and width of woven fabrics — Methods (<i>second revision</i>)

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Technical Textiles for Clothtech Applications including Narrow Fabrics and Braids Sectional Committee, TXD 39

<i>Organization</i>	<i>Representative(s)</i>
Additional Controller CQA (General Stores), DGQA, Ministry of Defence, Kanpur	SHRI A. CHOWDHURY (<i>Chairperson</i>)
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Member Secretary
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